DOCUMENT RESUME

ED 141 744 CS 003 372

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TITLE Readability: Linguistic Factors.
PUB DATE May 77
NOTE 9p.; Paper presented at the Annual Meeting of the International Reading Association (22nd, Miami Beach, Florida, May 2-6, 1977)

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS *Linguistics; Orthographic Symbols; Psycholinguistics; *Readability; *Readability Formulas; Reading Comprehension; Reading Research; *Research; Structural Analysis; Vocabulary

ABSTRACT

Although research on readability is still in its infancy, studies have been conducted concerning typographical features, semantic and pragmatic facets, linguistic factors, and orthographic dimensions. This paper discusses readability formulas, pointing out their limitations and listing 13 generalizations about them. The paper also outlines readability variables and concludes that, since structural and tranformational grammar are opening new vistas for research about linguistic factors in readability, psycholinguistic research merits serious consideration by graduate students in different disciplines. (JM)

READABILITY: LINGUISTIC FACTORS

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Considerable research has been done by Miles Tinker and others on typographical factors in readability. Some studies have been made to obtain indices to semantic and pragmatic facets of readability: abstract versus concrete vocabulary (ideas), idea density, (concept) morphemics, content/versus function (structure) words, figurative language. Most of the studies, however, have been focused on linguistic factors: vocabulary, form class, morphemic structure, and sentence structure. More recently, some attention has been given to the orthographic dimension of readability: phoneme-grapheme consistency, perceptual learning (category, cue, probability, alternation). Bridging linguistics and orthography are the contributions of both structural and transformational schools. Psychologists, linguists, and orthographers are continuing to expand concepts of readability at different levels of reader maturity.

Readability Formulas

In general, readability formulas are designed to sequence a series of books or to provide some index to the "ease" of reading material. Their authors are concerned with objectivity and practical application. The formulas are based on indicators of reading "ease" via an indirect approach. For example, one index

Presented at the International Reading Association Twenty-Second Annual Convention, Miami Beach, Florida, May 1977.
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to linguistic complexity is sentence length measured by syllables or by words; an index to concept burden, by the number of polysyllabic words. Combinations of these and other weighted factors provide indexes to readability. Within these limitations, the following generalizations may have some validity.

1. Readability formulas, based on language variables rather than reading behaviors, predict the influence of linguistic factors on comprehension.

2. Readability and comprehensibility are used often as synonyms.

3. Application of readability formulas requires attention to a specific need based on the reader's achievement level, maturity of interests and other facets of motivation, and cognitive development.

4. Readability formulas are used (a) to predict sequence (rank ordering) of books and/or to estimate the "reader level" of a book expressed in terms of grade or age level.

5. Readability formulas, and standardized tests, do not differentiate between the instructional and independent reading levels.

6. Readability formulas do not differentiate among the reading materials that capture the motivations of (a) high achievers in reading or (b) low achievers in reading with widely differing maturities.

7. Readability formulas do not differentiate among purposes for reading: literal, critical, creative.

8. Readability formulas do not differentiate among skills and attitudes required for a given activity: skimming to locate ideas, rapid reading to know what the author says, and study-type reading leading to conclusions (related facts, cause-effect, analogy).

9. In general, readability formulas are based on different types of vocabulary studies to produce variables associated with vocabulary diversity, "difficulty," "burden," "interest," and the like.

10. Vocabulary "difficulty" has been measured in terms of lexical word lists--short lists of (common) easy words for lower levels; longer lists for higher levels. (But a short list of words embracing a high percentage of function words and irregular spellings has not been investigated in depth.)

11. Various readability formulas provide indexes to comprehensibility of materials but there are many caveats for writers. For example, short sentences and "simple" vocabularies may interfere with rather than facilitate the development of concepts.

12. Idea "density" or complexity of concepts has been estimated via number of prepositional phrases and clauses, and number and proportion of different content words (e.g., nouns and verbs), but this approach to measurement of concept burden has serious limitations. (The assumption is made that easily accessible facets of language structure may be indicators of concept complexity.)

13. Readability formulas tend to give some weight to syntactic signals (clues) to meaning and to semantic constraints (e.g., shifts of meaning, classification and indexing ideas) and pragmatic cues (e.g., behavioral effects).

Readability: Variables

For pupils in sight-saving classes, one factor in readability looms large: legibility as measured by size of type, type face, line length, leading, interlinear spacing, and illumination.

For students in upper-elementary grades, high school, and college who are lower achievers in reading, two interrelated factors in readability are highly significant: interest (a facet of motivation) and linguistic elements as indicators of concept complexity.

Beginners in reading are confronted with a dual problem: (1) decoding the geometric forms of letters, words, and puctuation into speech (perception), and (2) decoding the message at the semantic-pragmatic level (cogniton). In addition, the beginner becomes aware of speech sounds and words which he uses automatically. Furthermore, he learns that the orthographic code uses the same letter to represent more than one speech sound (e.g., c in city and candy, or oo in look and moon), uses different letters to represent the same speech sound (e.g., Go, go; /ē/ in me, bee, seat), and uses irregular spellings for common words (e.g., one, you, was).

For beginners who are naive regarding the phonemic and/or morphophonemic bases of writing, orthographic factors may need much greater weight than for more mature readers who have mastered some of the numerous and complex rules of graphotactics. For these beginners, "easy" words, for example, may not be the commonest words with their variability in spellings.

Variables in readability formulas range from orthographic elements through vocabulary to concepts and personal interests. Some of these variables are listed below with the names of a few investigators.

1. Concepts yield vocabulary.
   a. Complex concepts tend to be expressed via higher-level abstractions. (Dolch, Flesch)
   b. The number of words within a basic word list promotes "ease" of reading. (Washburne and Vogel, Dale)
   c. Use of common words promotes "ease" of reading. (Lively and Pressey, Washburne and Vogel)
   d. The number of "hard" words increases reading difficulty. (Gray and Leary)
   e. The number of different words increases reading difficulty. (Lewerenz)
   f. Use of polysyllabic words tends to increase reading difficulty. (That is, word length influences readability.) (Lewerenz)

2. Concepts yield language structure.
   a. Length of sentence (word- or letter-length); sentence complexity (Lorge)
   b. Number of syllables per one-hundred words (Flesch, Fry)
   c. Number of prefixes and inflectional endings (Flesch)
   d. Number of different words (Washburne and Vogel, Gray and Leary, Flesch)
   e. Number of pronouns per one-hundred words (Gray and Leary, Coleman)
   f. Number of prepositional phrases per one-hundred words (Lorge, Coleman)

g. Number of vowels per one-hundred words (Coke and Rothkopf)

h. Number of one-syllable words (Farr et al)

i. Number of words with three or more syllables (Fog)

j. Average number of letters per word (Carver)

k. Number of characters per space and per sentence; i.e., letters, numbers, character spaces (Edgar A. Smith, Danielson and Bryan)

l. Words per paragraph (Morris)

3. Orthography of printed materials, a loose fit between graphemes and phonemes (segmental and suprasegmental), influences readability, especially for beginners.

a. Spelling irregularities, especially in beginning reading materials, increase accuracy of predicting reading difficulty. (Milton Jacobson)

b. A close correspondence between letters and sounds tends to increase reading "ease." (Jacobson)

c. Contractions tend to be spelling "demons" and may significantly influence reading difficulty in beginning reading materials. (Betts)

d. Punctuation has serious limitations for indicating pitch, stress, and juncture--intonational patterns. (W. Nelson Francis)

In Conclusion

After discussing Syntax and Readability (IRA, 1975), John Dawkins commented: ". . . we will be wise to remind ourselves that we know very little about readability." And we might add: short cuts to estimating readability via formulas have serious limitations because the individual reader is given only tangental consideration.

Although research on readability is still in its infancy, it has come a long way historically. In 1878, Javal's research on eye movements during reading paved the way for a spate of research on typographical features as factors in readability (legibility). Edward L. Thorndike's studies of reading vocabularies (1921), Ernest Horn's study of writing vocabulary (1926), Madeline Horn's study of speaking vocabulary (1927) triggered other researches and have served multiple uses in readability formulas. Finally, studies of both structural and transformational grammar are opening new vistas for research on linguistic factors in readability.

Readability is a fascinating facet of psycholinguistic research, meriting serious consideration by graduate students in different disciplines. In this respect, the future is before those who pay the price of scholarship and enlist the best efforts of producing scholars in cognate fields of endeavor.